

Testimony of
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On

“Wireless Broadband and the Future of Spectrum Policy”

Before the
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Thank you Chairman Thune, Ranking Member Nelson and members of the Committee for the opportunity to speak with you today about issues related to our nation’s long-term spectrum policy.

I am Blair Levin, a non-resident Fellow at the Brookings Institute Metropolitan Policy Program. Today, I am speaking solely in my personal capacity, reflecting on lessons I learned as Chief of Staff for FCC Chairman Reed Hundt (1993-1997), as a Wall Street analyst following the telecommunications and media sectors (2001-2008), and directing the writing of the National Broadband Plan (2009-2010.)

Two lessons from the Plan are at the heart of today’s hearings: the growing demand for spectrum and the significant time it takes to repurpose spectrum from existing to future uses. This hearing will reveal different points of view on several topics but I am sure we all agree the failure to adopt policies that repurpose spectrum efficiently will have negative consequences on our economy and society. With the “Apps Economy” already responsible for over a half million jobs¹ and new markets like the Internet of Things soon to create trillion dollar market opportunities², the Chairman of the Council of Economic Advisors and the Chief Technology Officer were no doubt correct to observe in the Wall Street Journal that avoiding a spectrum crunch by “making more spectrum available (is) one of the most critical infrastructure projects of the 21st century.”³

Early in the process of developing the Plan, we decided to include a chapter on spectrum. The connection between spectrum and broadband may today seem obvious but at the time this was actually a novel decision. We recognized that broadband use was migrating to mobile. At the same time, there was almost no new spectrum in the pipeline suitable for mobile use. We noted that the process of revisiting or revising spectrum allocations historically had taken 6 to 13 years.⁴ The essence of many of our spectrum recommendations was to speed up that process,

¹ http://files.ctia.org/pdf/The_Geography_of_the_App_Economy.pdf

² http://www.mckinsey.com/insights/business_technology/the_internet_of_things_the_value_of_digitizing_the_physical_world

³ <http://www.wsj.com/articles/jason-furman-and-megan-smith-how-to-avoid-spectrum-crunch-1421970841>

⁴ Exhibit 5-C: Time Historically Required To Reallocate Spectrum at <http://www.broadband.gov/plan/5-spectrum/>

trying a number of new approaches to align stakeholder incentives and reduce friction to spectrum repurposing.

We established the ambitious (but now-familiar) goal of repurposing 300 megahertz between 225 and 3700 MHz for mobile use in five years and 500 megahertz for broadband use in ten years.⁵ In connection with the five-year goal we released a spectrum demand study.⁶ Some suggested we were exaggerating the need. It now appears that we were close, but if anything, underestimated the need.⁷ Our quantitative goals, and the supporting analysis, helped to clarify the public interest in spectrum repurposing at a time when there, frankly, had not been much interest in planning for the future.

I am pleased to say that the government has been quite successful in tracking the spectrum goals established in the plan. Five years later, we have, according to NTIA, repurposed 245 megahertz.⁸ I think it is not unreasonable to expect, given considerable broadcaster interest in the incentive auction, that that repurposing metric may be above 300 megahertz when that auction concludes, about six years after the publication of the Plan.⁹

Nevertheless, we cannot rest on our laurels and must always look to the future. We still have not gotten all the way to 500 megahertz, but I understand work continues on several fronts including the 5 GHz unlicensed band, which may move us toward this benchmark. Looking even farther into the future, I think we need to move beyond simple megahertz targets and focus more on the underlying economic and bureaucratic incentives that will lead to “self-healing” policies where spectrum supply can, over time, evolve to match ever-changing technological demands.

To this end, the government has two critical tasks: allocating spectrum and repurposing spectrum. On the allocation question, I believe the government is on the right track in allocating spectrum to a diversified portfolio of licensed, unlicensed and shared uses.¹⁰ We also need to preserve room for growing numbers of sensors, radars, RFIDs, beacons, and other technologies – miniaturized to fit inside your phone, car, and other devices – that will come to define the Internet of

⁵ Recommendation 5.8: The FCC should make 500 megahertz newly available for broadband use within the next 10 years, of which 300 megahertz between 225 MHz and 3.7 GHz should be made newly available for mobile use within five years. The President, of course, made a similar 10-year commitment. See <https://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution>.

⁶ <https://transition.fcc.gov/national-broadband-plan/mobile-broadband-paper.pdf>

⁷ http://www.ctia.org/docs/default-source/default-document-library/bazelon_mchenry_spectrum-deficit_2015-06-23.pdf.

Further, it could well be, given needs that we cannot accurately assess, such as the Internet of Things, connected cars, drones, and business applications for high-resolution two way video, among others, that even today’s estimates will be too low.

⁸ <http://www.ntia.doc.gov/blog/2015/nearly-halfway-meeting-spectrum-target>

⁹ It is, admittedly, a year late. But only one year late, given the history and magnitude of the problem is not too shabby. It demonstrates what is possible when there is a focused effort. See footnote 16, below.

¹⁰ The President’s Council of Advisors on Science and Technology made an enormous contribution to our understanding on the opportunities for sharing in its 2012 report, offering insights far beyond what we were able to do with the Plan in 2010.

https://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf. Further, the President has also followed up on that report with a second spectrum related executive memorandum.

<https://www.whitehouse.gov/the-press-office/2013/06/14/presidential-memorandum-expanding-americas-leadership-wireless-innovation>.

Things. The last two decades have taught us that we don't want a spectrum monoculture.

I also believe we cannot assume that future network architecture will be the same as today's architecture and the only recourse to future demand is to "pour on more spectrum." Spectrum is too precious a resource not to be used in ever more intensive and creative ways. The generational march of technology (from 3G to 4G and, soon, 5G) is only part of this story. Inevitably, our networks will have to migrate toward greater and greater density (i.e., small cells), more productive re-use (i.e., sharing), and new and different deployment models (i.e., software defined networks)¹¹. The Commission's recent 3.5 GHz rules provide an important nudge toward this kind of innovation, which could yield capacity gains many times greater than the mere addition of a new spectrum band.

But, we can't allocate what we have not freed up. As we have basically already allocated all spectrum, I will focus my comments on the other principal task going forward--repurposing spectrum.

Approaches to Repurposing. When we arrived to work on the Plan, for the first time since before I served as Chief of Staff nearly two decades earlier, there was no spectrum designated for auction. In light of the evidence in the demand studies, the Plan team focused on repurposing. The team immediately recognized there were four ways to approach the task:

- *Status Quo.* Assume the original allocation represented some form of Edenic perfection. Given changing markets and technology, this was obviously the wrong policy.¹²
- *Liberalization.* Allow all licensees to freely sell any spectrum to the highest bidder. In the case of highly fragmented bands (such as the TV bands), for reasons summarized in what is referred to as the "Letter from 112 Economists," that approach entails enormous risks and costs.¹³ In other bands (e.g., AWS-4), this approach could be a viable option.
- *Command-and-Control.* Have the FCC exercise its power as the licensor to repurpose a band anytime it believes reallocation is needed. This approach, which can work in discrete areas, represented the then-current approach. It also has many problems, including the time caused by litigation and other problems inherent in the command-and-control approach.¹⁴
- *Market-Mechanisms.* Develop tools that use market signals and mechanisms to move spectrum to higher and better uses. This had numerous problems, including lack of legal authority and prior examples. Nonetheless it appeared

¹¹ Chairman Wheeler discussed some of the implications of software defined networking in a recent speech at Brookings. <https://www.fcc.gov/document/remarks-fcc-chairman-tom-wheeler-brookings-institution>

¹² While wrong, the assumption that a past allocation creates permanent rights is at the root of a number of policy arguments.

¹³ http://www.politico.com/static/PPM41_april6_economists_letter_to_obama_regarding_incentive_auctions.html

¹⁴ Since Ronald Coase's seminal paper in 1959, there has been a general view moving away from command-and-control and towards more flexible use. See, for example, the Federal Communications Commission Spectrum Policy Task Force, Report of the Spectrum Efficiency Working Group, November 15, 2002.

more promising than the others, so we focused our efforts on that opportunity.

That work ultimately resulted in, among other recommendations, Recommendation 5.4 of the Plan, that Congress should authorize the FCC to conduct incentive auctions. Congress did so in the 2012.¹⁵

But I want to be clear that the Plan was not the originator of the incentive auction. It came from various ideas developed by Commission Staff, such as Evan Kwerel and John Williams¹⁶, and various papers, particularly one specifically about broadcast spectrum authored for the Brookings Institute by University of Colorado Law School Dean Phillip Weiser,¹⁷ that proposed versions of an incentive auction to repurpose spectrum.

Policy progress is never a solo performance; it's always a relay race. As we focused on market mechanisms, we were fortunate to be able to take the baton from those earlier thought pieces, race through our lap, and then hand the baton off to the Congress and the members and staff of this Committee, including Commissioner Rosenworcel, who was then serving as Staff for then Committee Chair Senator Rockefeller, who led in crafting legislation by which Congress in turn handed the baton back to the FCC who, thanks to great staff work and tremendous leadership of Chairman Tom Wheeler, has put our country in the position being able to hold an auction early next year. It has been a complicated and difficult task and they are getting a lot right. In particular, I should commend them for keeping to three big priorities: maximizing for the return of licensed spectrum, accommodating unlicensed use on a non-interfering basis, and understanding that we need to hold the auction as soon as possible. Delay imposes large costs on the economy.¹⁸

Herein lies a critical lesson for this Committee about time. CTIA just released a study about the time it takes to repurpose spectrum. I could quibble with some of the factual assessments¹⁹ in the study, but most important, I agree with its bottom line, there is "reason for optimism that we can work collaboratively to shrink that timeline."

¹⁵ <http://www.gpo.gov/fdsys/pkg/PLAW-112publ96/pdf/PLAW-112publ96.pdf>. See Title VI, Subtitle D.

¹⁶ <http://wireless.fcc.gov/auctions/conferences/combin2003/papers/masterevanjohn.pdf>

¹⁷ http://www.brookings.edu/~media/research/files/papers/2008/7/wireless-weiser/07_wireless_weiser.pdf

¹⁸ As Doug Brake of the Information Technology and Innovation Foundation has written, "Spectrum is a peculiar resource, if it can even be called a resource at all. It is infinitely renewable, divisible in 6 to 8 dimensions, 26 and unused spectrum is wasted opportunity that can never be recaptured." <http://www2.itif.org/2015-coase-wifi.pdf?ga=1.167425398.95312237.1437826419>. In that light, every day of delay in repurposing spectrum is an economic drag on our economy.

¹⁹ For example, while it is not wrong to write that the AWS-3 spectrum process began in 2002, the focused efforts began after Congress demanded an auction in its 2012 legislation. The 15 years to deployment suggested in the study is, in my book, more accurately described as 5 years of work. Similarly, in AWS-4, the concentrated work began in 2010, not 2002. I also slightly disagree with the assertion in the study that after "the broadcast incentive auction, the traditional licensed pipeline is empty." There are still some proceedings pending through which the FCC can facilitate making more licensed spectrum available to carriers, though admittedly, the number of such proceedings is small.

My optimism is based on history, which shows that when government decides to repurpose spectrum, it can do so in a reasonably quick manner. Yes, there are some negative stories but during some of the periods of more than a decade cited in the study, it was the government itself that, frankly, was not moving quickly. On the other hand, as demonstrated with such efforts as AWS-3 and the incentive auction relay team, a focused, targeted effort can repurpose spectrum in a timely manner. After all, it took 35 years from Ronald Coase's proposal²⁰ for the FCC to hold an auction. In contrast, it will take only 8 to move from Dean Weiser's paper to an actual auction. And it only took two years from the Congressional mandate for an AWS auction to the actual auction.

While on the second anniversary of the Plan, I was pessimistic about our spectrum prospects²¹, I have to say that the last few years has been a good-news story. As discussed above, the government, on a bi-partisan basis, involving the good work of both the executive and legislative branches, has acted to repurpose significant amounts of spectrum. The question is whether the good news continues or it stops.

Repurposing Government Spectrum. For the good news to continue, we have to find ways to more effectively repurpose government spectrum. As discussed above, I start from the premise that embedding more market signals into the decision process for spectrum use is the right place to start.

Potential Concerns with a Government Incentive Auction. One way to do so would be to simply take the incentive auction design and apply it to government spectrum. This has in fact been proposed by a number of parties.²²

I applaud the spirit and purpose of such proposals. I obviously agree with the principle of incentives and am delighted that the Plan's proposal is subject to the sincerest form of flattery. Nonetheless, I have to note a number of concerns that such a plan will not produce the results we all seek. Briefly, I think such a plan faces the following barriers:

- 1. Government spectrum has multiple users.** In the broadcast incentive auction, a single licensee controls the decision of whether or not to participate.²³ With government spectrum, there are generally multiple users, creating additional transaction costs, holdout problems and other difficulties in determining who will receive the incentive payment, which also diminishes the motivating power of the incentives.

²⁰ 1959. The Federal Communications Commission. *Journal of Law and Economics* 2:1-40.

²¹ <http://broadbandandsocialjustice.org/2012/03/when-an-roi-500-times-better-than-goldman-isn%E2%80%99t-enough-reallocating-our-focus-on-reallocating-spectrum/>

²² <http://www.markey.senate.gov/imo/media/doc/2015-03-26-Federal%20Spectrum%20Incentive%20Act-billtext.pdf>

²³ Of course, the success of the broadcast incentive auction depends on a sufficient amount of broadcasters per market deciding to sell at a price that buyers are willing to pay. But the decision to participate is done at the individual licensee level, which is not analogous to the situation with spectrum used by the federal government.

- 2. While all transactions have the potential for a principal-agency problem, the problem is much worse for government actors than private sector actors.** Many decisions throughout the economy involve what is known as the “principal-agent problem”, in which the agent, acting on behalf of the principal but with different motives and significantly more information, may not act in the principal’s best interest.

To some extent, I saw this when I first started discussing the incentive auction with broadcasters. Economic theory would have suggested nothing but support for creating option value for the firm owners in an asset that otherwise could not be monetized. Instead I got significant pushback from some who expressed concerns about the impact on their jobs. That opposition has been quieted, to some extent, by the FCC’s wise decision to make public the potential economic opportunity for the principals.²⁴

The principal-agent problem is significantly more problematic in a government setting. This is not a criticism of any government employees who I deeply respect. It is simply to acknowledge that the impact of market signals and financial incentives on the decisions of broadcast licensees as to whether to participate in an auction will be substantially greater than on federal government employees who will neither see the same signals or benefit financially.²⁵

- 3. The budget process creates a snap back option.** In addition to the principal-agent problem, the incentive for government officials to recommend their agencies participate would be diminished further by the understandable fear that any gain in one year with auction proceeds would be offset with congressional budget cuts in subsequent years.
- 4. The asymmetry of government service risk/reward.** I have done two stints in the federal government but have spent most of my professional career in the private sector. In every institution in which I have worked, different employees have a different view of their risk/reward ratio for any particular decision. In the aggregate, however, in my experience, government employees are far more concerned about the risk of a wrong decision than the rewards for the right one. This is not surprising and it is also not bad.²⁶ In the context of this proposed auction however, we should understand that agency decision makers are likely to over-index for the risk

²⁴ <http://wireless.fcc.gov/incentiveauctions/learn-program/docs/ia-opportunities-book.pdf>

²⁵ For a contrary view, that federal employees will be appropriately motivated by the opportunity to retain financial assets from the sale of government property, see http://www.brookings.edu/~media/research/files/papers/2014/09/23_buildings_bandwidth_spectrum_property/23_buildings_bandwidth_spectrum_property.pdf

²⁶ Consider, for example, how many hearings Congress has held to examine allegations of problems caused by the actions of government employees relative to how many hearings it has held to praise government employees. Given the oversight responsibility, the ratio is appropriate. But we have to understand the impact on employees in their decision-making.

of not having the spectrum they need to perform critical functions and under-index the reward for repurposing spectrum.

5. **It will be difficult to thread the needle between providing enough money to incent repurposing of spectrum and too much so that either the amount or the use does not cause a political backlash.** In the broadcast incentive auction, broadcasters will effectively be competing to determine the clearing price and therefore, market forces will set the price for their licenses. For a government incentive auction, proponents have suggested that the price paid to existing agency users will be set as a percentage of the wireless action proceeds. If the percentage is too low, the agencies will not sell.²⁷ If it is set too high, some agencies will receive what the public perceives as a windfall and both the money and the subsequent use of the money is likely to be heavily scrutinized by the public, dampening any agency's enthusiasm for participating in a future auction. That is, in the wake of the broadcast incentive auction, the public is unlikely to notice or complain how the selling broadcasters use the dividends of their capital asset restructuring. That will not be true for federal employees using what some will characterize as a windfall outside the normal budget process, so the process of repurposing government spectrum, over time, may not be sustainable.²⁸

6. **Creating property rights for individual agencies may create perverse hoarding incentives.** If the Congress were to announce the possibility of different agencies benefitting at some ill-defined time in the future by returning spectrum, that could lead to a spectrum gold rush within federal agencies who want the option value (either in terms of money or negotiating leverage) of such a benefit. Given the asymmetry of information that leads to difficulty in evaluating the real needs of spectrum for an agency's mission, the law of unintended consequences may kick in and NTIA could find that its job of spectrum manager is more difficult and the process could result in less spectrum repurposed.

To be clear, I am not saying to take the option of a government incentive auction off the table. The experience of the Base Closing Commission is instructive for how to incent federal employees to support repurposing assets and there is some evidence from that experience that my concerns are overstated.²⁹ My own experience, however, suggests that federal employees consider spectrum as a strategic asset in a

²⁷ The proposed legislation sets the fee at 1%, not because an economic analysis determined that was the right price but rather based on budget rules. See Page 40 of "Making Waves: Alternative Paths to Flexible Spectrum Use.

<http://www.aspeninstitute.org/sites/default/files/content/docs/pubs/Making-Waves.pdf>. It strikes me that 1% is too low but of course, no one has any idea.

²⁸ This is similar to the issue of setting the right incentives for Designated Entities (DEs) in auctions. If the incentives are not sufficient, no DEs participate. If the incentives are too rich, there is a political backlash. Overtime, the cycle of one followed by the other makes it difficult for the FCC to design a sustainable, successful program.

²⁹http://www.brookings.edu/~media/research/files/papers/2014/09/23_buildings_bandwidth_spectrum_property/23_buildings_bandwidth_spectrum_property.pdf

way that real estate is not, so my skepticism about the ability of a government incentive auction remains. But I urge further study and consideration of all options.

Other Alternatives to Repurposing. In that light, as Congress considers the question of how to accelerate repurposing of government spectrum, it ought to consider the concerns I have noted as well as other options for inserting market signals into government spectrum decisions. These other options include the following:

- 1. Administrative pricing.** Administrative pricing is the idea that each government agency that utilizes spectrum is charged in the budget some amount that reflects a broad measure of opportunity costs, thus creating a market signals among government users and others in the government, such as Congress, about the cost of spectrum and encourages agencies that are not using spectrum to move the spectrum off its books. As discussed in the National Broadband Plan, England has been successfully using this technique to more efficiently plan for and use spectrum in government operations.³⁰ Work on this has already taken place through a Presidential memorandum³¹ and an OMB Directive³² but I believe a clear Congressional directive could strengthen the impact of such a policy.
- 2. Further amendments to the Commercial Spectrum Enhancement Act (CSEA).** The CSEA³³ encourages federal incumbents to clear spectrum not being put to its most productive use by establishing a Spectrum Relocation Fund (SRF) to reimburse federal agencies operating on certain frequencies that have been reallocated to non-federal use. With certain revisions, CSEA could become an even more effective tool for relocating federal incumbents from reallocated spectrum and for developing technological advances that will enable future repurposing of federal spectrum.

The CSEA funding mechanism was first utilized in connection with the auction of former federal spectrum in the AWS-1 auction, which concluded in September 2006. The auction proceeds attributable to the former federal spectrum amounted to \$6.85 billion, while, the relocation costs totaled approximately \$1 billion, a return on investment the most successful investors on Wall Street would envy. Further, federal incumbents received modernized systems in other frequency bands, demonstrating that relocation can be a win-win-win: for incumbents, for the U.S. Treasury, and, most importantly, for the American public, which benefits from increased access to the airwaves.

³⁰ The National Broadband Plan, page 83, Box 5-1.

³¹ <https://www.whitehouse.gov/the-press-office/2013/06/14/presidential-memorandum-expanding-americas-leadership-wireless-innovation>

³² OMB Circular A-11 Office of Management and Budget (OMB) Circular No. A-11 (OMB 2013)

³³ Title II of H.R. 5419, Pub. L. No. 108-494, 118 Stat. 3986, 3991 (*codified at* 47 U.S.C. §§ 151, 301,302, 303.)

Congress should improve the CSEA to ensure that the full range of costs is covered to provide federal agencies incentives and assistance, including up-front planning, technology development and staffing to support the relocation effort. Agencies should be compensated for using commercial services and non-spectrum-based operations, in addition to dedicated spectrum-based system deployments. The SRF should be available to reimburse incumbent federal users who have to upgrade equipment to accommodate other federal users moving onto the incumbents' band. Most importantly, Congress should allow funds to be used to "prove out" new deployment concepts that have a high likelihood of resulting in a major auction. Agencies will not commit to major technology transitions unless they believe their mission capability will be significantly upgraded. The law, as currently written, makes it difficult for OMB to authorize the release of SRF money to spectrum repurposing projects unless the agency commits to the auction, presupposing the outcome that the money is needed to test. This creates a Catch-22, boxing in federal agencies and leading to inaction instead of providing a clear path forward to repurposing when the economics justify the repurposing.

3. **Providing Incentives for private sector bounty hunters.** Taking the CSEA idea one step further, we should incent the private sector to come up with creative solutions for repurposing government spectrum to create the kind of win-win-win options that the CSEA enables. One way to do so, as suggested by my co-panelist Commissioner Rosenworcel, is to create a prize for the first person to use spectrum more efficiently.³⁴ Another way, more focused on repurposing government spectrum, is to give private sector actors incentives to free up government spectrum by giving the private actors the right to use and sell the spectrum if they can provide the government agency with an equivalent service. This could be accomplished in a number of ways but one would be to auction to private enterprises the right to negotiate with a particular government agency. While such an auction would not likely raise much money, it could give private sector actors incentives to develop creative ways to more efficiently use equipment and other technological developments to free up spectrum.
4. **A GSA for spectrum.** Another approach is to treat spectrum the way the federal government treats most of its real estate needs, by centralizing the spectrum management function. Instead of each agency handling its own real estate, the Government Services Administration controls the overall portfolio. Similarly, the federal government could put all government-used spectrum under the control of a single administrator. That agency, particularly if it is part of the Office of Management and Budget, will ensure that the spectrum is used efficiently and would be able to balance the needs

³⁴ http://www.mercurynews.com/opinion/ci_26597034/marty-cooper-and-jessica-rosenworcel-heres-how-expand

of the government agencies for spectrum and the possibility of raising revenues by leasing spectrum to private parties.³⁵ As this idea was first proposed by my co-panelist, Tom Lehnard³⁶, I will let him explain it, but I think it is an excellent idea³⁷ and urge its adoption.

None of these ideas are exclusive and each carries their own trade-offs, in terms of time and execution risk. Nonetheless, all should be on the menu of options Congress should consider in addressing the country's long-term spectrum needs.

Wired Broadband Deployment Agenda. In addition, Congress should understand the emerging hybrid relationship of our broadband networks. It is a mistake to think of two distinct broadband networks, fixed and mobile. The different network architectures interact and Wi-Fi, which largely connects over fixed, wireline infrastructure, carries more increasingly carries more of what we think of as "mobile" data traffic.³⁸ That is relevant to this hearing because the more robust our wireline network is, the more Wi-Fi off-load can relieve the pressure on our scarce spectrum assets.

Last week the House Communications and Technology Subcommittee held a hearing on "Promoting Broadband Infrastructure Investment"³⁹ to explore how to incent investments to increase bandwidth abundance on the wireline side. In truth, we are not really looking for a path to spectrum abundance; we are looking for *capacity abundance*, which requires multiple strategies using multiple assets. As was clear from that hearing, there are a number of private⁴⁰, federal⁴¹, and local⁴² developments accelerating next generation wireline network deployments. Just as I hope the House Committee holds hold a hearing on repurposing spectrum⁴³, I hope you explore the topic they addressed, as there is an important relationship between developments on both the wireline and wireless sides.

Plan Beats No Plan. In closing, I would like to take this opportunity to thank Congress for directing the writing of the National Broadband Plan, which I was privileged to lead. It was a great and rare gift to work with an incredibly dedicated

³⁵ Some might believe that NTIA is already authorized to perform this function. Unfortunately, in my view, NTIA is structurally hamstrung. It is a coordinator, rather than a manager, without budget authority, of spectrum resources. I think NTIA in recent years has done an extraordinary job of repurposing spectrum, even more extraordinary when one understands its limited tools. One option Congress should also consider would be to give NTIA the tools to be a strong central manager of federal spectrum.

³⁶ https://www.techpolicyinstitute.org/files/lenard_white_ostp_gsoc.pdf

³⁷ I recognize that some have suggested the analogy with GSA has it limits, particularly as spectrum issues go to the core mission of an agency, which is not true of real estate decisions. See <http://fedscoop.com/federal-spectrum-reform>. Still, I believe that having a dedicated team, expert in spectrum and networks, serving the broader federal needs would go a long way to providing a balance of information about options that is essential for the federal government to use spectrum more efficiently.

³⁸ Juniper recently predicted that Wi-Fi networks will carry almost 60% of smartphone and tablet data traffic by 2019.

http://www.juniperresearch.com/press/press-releases/wifi-to-carry-60pc-of-mobile-data-traffic-by-2019?utm_source=gorkanapr&utm_medium=email&utm_campaign=dataoffload15pr2

³⁹ <http://energycommerce.house.gov/hearing/promoting-broadband-infrastructure-investment>

⁴⁰ <http://docs.house.gov/meetings/IF/IF16/20150722/103745/HHRG-114-IF16-Wstate-SlingerM-20150722.pdf>

⁴¹ The FCC approval of the AT&T/DirecTV deal includes a significant commitment to build-out Fiber to the Premises networks.

⁴² http://www.gig-u.org/cms/assets/uploads/2012/12/Val-NexGen_design_7.9_v2.pdf

⁴³ That hearing wisely included testimony on wireless infrastructure but did not focus on spectrum.

and talented group of Americans on a short-term basis with a mandate to think long-term. As we look back over five years we can see a number of benefits of that kind of process in terms of accelerating clarity about the long-term obstacles and opportunities we have. In looking at this critical question of repurposing government spectrum, I urge you to consider using a similar, though appropriately modified, process of a short, focused, analysis that quickly leads to plan for repurposing the government spectrum we need for bandwidth abundance and economic leadership in the 21st Century Information Economy.